1 December 1964

MEMORANDUM FOR : Chief and Deputy Chief, GSD

SUBJECT : VA-12 Recording

1. I have sent you a small flury of approaches that might be taken towards the VA-12 recording problem. The attached pieces of paper indicate some possible schemes if you had to live with direct oscilloscope.

2. I have assumed on page 1, section A, that five (5) parameters are to be measured and that these parameters appear at the back end of the receiver in an analog form represented by a voltage magnitude. This is translated into terms of delay from the time of sweep start. Each parameter is assigned a particular pulse amplitude. On 1 sweep, then, 5 pulses will be seen, and these can be sorted by density for parameter identification, and be delay from initiation of the sweep for the magnitude of the parameter represented. Assuming a 1 mill spot size, which is pretty easy to come by these days, you can write 1,000 lines per inch, but if a 10 to 1 reduction is used, you approach the resolution of the film with 104 lines per inch.

3. Section B indicates how film might look if just 1 radar were being seen and the PRF was jittering. If a number of signal sources are taken in turn, the identification of these sources can be sorted either by periodic sampling through the VA-12 capacity, or identification through common characteristics.

4. Section C indicates the readout, and I have assumed that a 10 to 1 reduction occurred in recording. Hence, I have shown as 1 to 10 enlargement; obviously, larger values are possible if desirable. The output of this projector is focused on the face of a vidicon which then reads the material trace by trace. The output is unscrambled through the use of pulse height discrimators, the data then being recorded on charts, punched cards, or other convenient format for manual or automatic analysis.

5. In section D it appears that a 10 to 1 reduction would allow 4 hours of operation at 50 usec sample rates with only 240 feet of film.

6. On page 2 we go a little bit further than E and presume that a 1 inch width of film is used. In this case the trace may accommodate 10-50 usec samples side by side. The accuracy isn't quite as good, of course, but it may be adequate and the length of film now comes, of course, to the 240 foot value.

7. Since in E the accuracy becomes a matter of resolution on the tube face, say 1 part in a thousand for a 1 inch tube, some improvement might be made by using a 2 or 3 inch tube and holding a .001 inch diameter spot size.

8. It has been assumed throughout that the amplitude of the parameters would not be identical, hence would not have a common delay and fall at the same point. This problem gets to be a little bit more serious if 10 sets are taken in 1 trace. In this case some allocation among the sections might be desirable. This does not seem to be very desirable, however, or necessary.

9. I think some consideration ought to be given to recording "changes only" after an initial set of values is written for any emitter; i.e., I think the introduction of some logic into the recording process which can be done with a micromodular circuits could clearly aleviate the volume of data which is now planned for recording.

10. I would appreciate your comments.

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